



## **Cisco 1750 Router Hardware Installation Guide**

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*Cisco 1750 Router Hardware Installation Guide*

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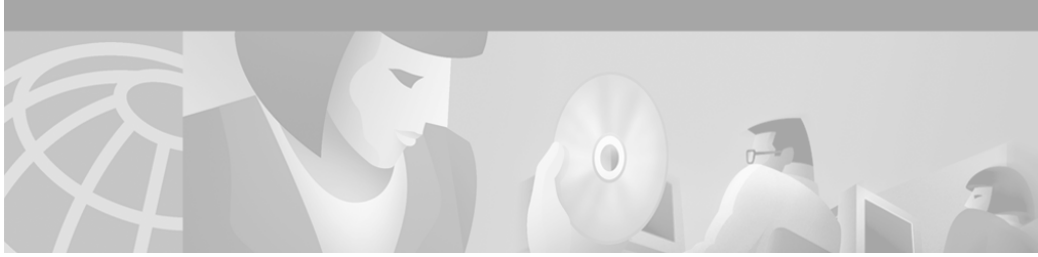
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## About This Guide

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This section discusses the intended audience, scope, and organization of the *Cisco 1750 Router Hardware Installation Guide* and defines the conventions used to convey instructions and information.

You can access Cisco documentation and additional literature on the World Wide Web at <http://www.cisco.com>, <http://www-china.cisco.com>, or <http://www-europe.cisco.com>.

If you are reading Cisco product documentation on the World Wide Web, you can submit comments electronically. Click **Feedback** in the toolbar, and select **Documentation**. After you complete the form, click **Submit** to send it to Cisco. We appreciate your comments.

## Audience and Scope

This guide is for users who have some experience installing and maintaining networking hardware. We assume that Cisco 1750 router users are familiar with the terminology and concepts of local Ethernet and wide-area networking.

This guide describes the functional and physical features of the Cisco 1750 router and provides installation procedures, troubleshooting information, technical specifications, and cable and connector guidelines and specifications.

## Organization

This guide is organized as follows:

- Chapter 1, “Cisco 1750 Router Overview,” describes the router features, front-panel LEDs, rear-panel LEDs, and connectors.
- Chapter 2, “Installation,” describes how to install the router by connecting cables, power, and install WAN interface cards (WICs) and voice interface cards (VICs).
- Chapter 3, “Troubleshooting,” describes some problems that you might have with the router and how to solve these problems.
- Appendix A, “Technical Specifications,” lists the physical characteristics, environmental requirements, and power specifications for the router.
- Appendix B, “Cabling Specifications,” lists the physical characteristics of the cables and connectors used with the router.
- Appendix C, “Installing and Upgrading Memory and Data Modules,” describes how to install or upgrade memory or data modules in your router.

## Related Publications

The following publications provide related information on this product:

- *Voice-over-IP Quick Start Guide* that came with your router explains how to install voice hardware and how to configure the router for a Voice-over-IP (VoIP) network.

- *Cisco 1700 Router Software Configuration Guide* describes some common network scenarios and how to use the Cisco IOS command-line interface (CLI) to configure the router in these scenarios.
- *Cisco 1750 Router Voice-over-IP Configuration Guide* provides instructions on how to use Cisco IOS software to configure voice interfaces.
- *Cisco WAN Interface Cards Hardware Installation Guide* describes how to install and configure the WICs and VICs that are supported by the Cisco 1750 router.
- Cisco IOS command reference and configuration guides provide complete information about all Cisco IOS CLI commands and how to use them, as well as information on designing and configuring LANs and WANs.

## Conventions

This guide uses the following conventions for instructions and information.

## Notes, Cautions, and Warnings

Notes, cautions, and warnings use the following conventions and symbols:

**Note**

Means reader take note. Notes contain helpful suggestions or references to materials not contained in this manual.

**Caution**

This caution symbol means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

**Warning**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with the standard practices for preventing accidents.

**Waarschuwing**

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen.

**Varoitus**

Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista.

**Attention**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents.

**Warnung**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt.

**Avvertenza**

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti.

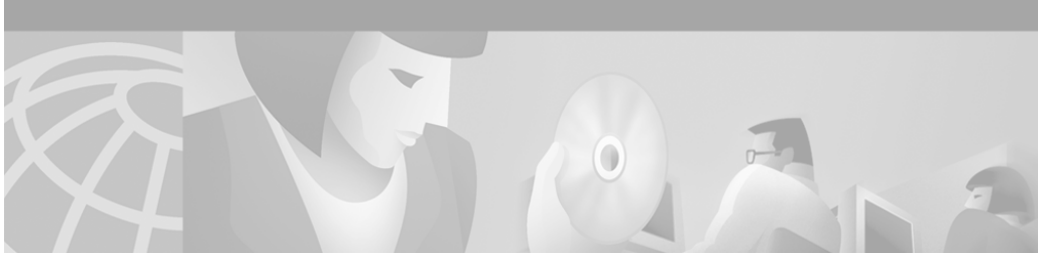
<b>Advarsel</b>	<b>Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker.</b>
<b>Aviso</b>	<b>Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes.</b>
<b>¡Atención!</b>	<b>Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes.</b>
<b>Varning!</b>	<b>Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador.</b>

## Commands

Table 1 describes the syntax used with the commands in this document.

**Table 1**      **Command Syntax Guide**

Convention	Description
<b>boldface</b>	Commands and keywords.
<i>italic</i>	Command input that is supplied by you.
[   ]	Keywords or arguments that appear within square brackets are optional.
{ <b>x</b>   <b>x</b>   <b>x</b> }	A choice of keywords (represented by <b>x</b> ) appears in braces separated by vertical bars. You must select one.
^ or Ctrl	Represent the key labeled <i>Control</i> . For example, when you read ^D or <i>Ctrl-D</i> , you should hold down the Control key while you press the D key.
screen font	Examples of information displayed on the screen.
<b>boldface screen font</b>	Examples of information that you must enter.
<   >	Nonprinting characters, such as passwords, appear in angled brackets.
[   ]	Default responses to system prompts appear in square brackets.



# 1

## Cisco 1750 Router Overview

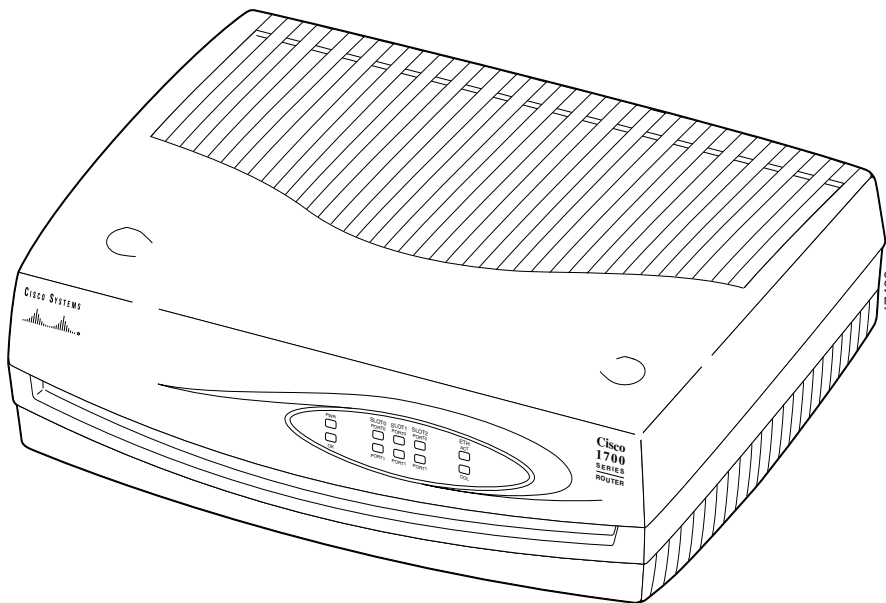
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This chapter introduces the Cisco 1750 router, also referred to in this guide as “the router,” and covers the following topics:

- Key Features
- Rear-Panel Ports and LEDs
- Front-Panel LEDs
- Router Memory
- Unpacking the Router
- Additional Required Equipment

Figure 1 shows the Cisco 1750 router.

**Figure 1**     **Cisco 1750 Router**



## Key Features

The Cisco 1750 router is a voice-and-data capable router that provides Voice-over-IP functionality (VoIP) and can carry voice traffic (for example, telephone calls and faxes) over an IP network. Using one to four WAN connections, the router links small-to-medium-size remote Ethernet and FastEthernet LANs to central offices. Table 1 lists the router key features.

**Table 1**     **Key Features**

Feature	Description
One FastEthernet (10/100BaseTX) port	<ul style="list-style-type: none"> <li>Operates in full- or half-duplex mode (with manual override available).</li> <li>Supports autosensing for 10- or 100-Mbps operation.</li> </ul>



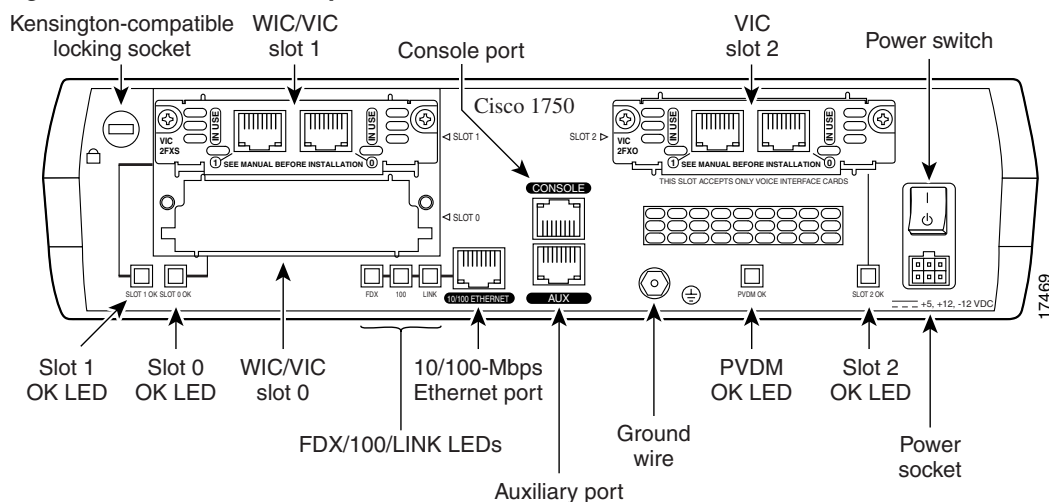
**Table 1**    **Key Features (continued)**

Feature	Description
Cisco interface cards	<ul style="list-style-type: none"> <li>• Supports two slots for either WAN interface cards (WICs) or voice interface cards (VICs).</li> <li>• Supports one VIC-only slot.</li> <li>• Supports the following WICs: ISDN BRI (U and S/T), 56- or 64-kbps DSU/CSU, FT1/T1 DSU/CSU, high-speed serial, dual-serial, and 2Async/Sync.</li> <li>• Supports the following VICs: 2FXS, 2FXO, 2E&amp;M.</li> <li>• Changes in WAN interface configuration can be made as your network requirements change.</li> </ul>
Console port	Supports router configuration and management from a connected terminal or PC. Supports up to 115.2 kbps.
Auxiliary port	Supports modem connection to the router, which can be configured and managed from a remote location. Supports up to 115.2 kbps.
Security slot	Supports Kensington or similar lockdown equipment.
SNMP support	Supports Simple Network Management Protocol (SNMP) to manage the router over a network.
AutoInstall support	Supports AutoInstall to download configuration files to the router over a WAN connection.
Cisco ConfigMaker support	Supports Cisco ConfigMaker application, a wizards-based software tool, to configure a network that includes the Cisco 1750 router.
Cisco Voice Manager support	Supports Cisco Voice Manager to help you install and operate voice and fax services over the IP network.
Compatible with Cisco Networked Office stack	Stackable with other Cisco Networked Office stack products.

## Rear-Panel Ports and LEDs

This section describes the router rear-panel ports and LEDs, which are shown in Figure 2 and described in Table 2 and Table 3.

**Figure 2** *Rear-Panel Components and LEDs*



**Table 2** *Rear-Panel Connectors*

Connector/Slot	Label/Color	Description
Ethernet port	10/100-Mbps ETHERNET (yellow)	Router connection to the local Ethernet network. This port autosenses the speed (10 or 100 Mbps) and duplex mode (full or half) of the device to which it is connected and then operates at the same speed and in the same duplex mode.
Auxiliary port	AUX (black)	Modem connection for remote configuration using Cisco IOS software.
Console port	CONSOLE (light blue)	Terminal or PC connection for local configuration using Cisco IOS software.

**Table 2**    *Rear-Panel Connectors (continued)*

Connector/Slot	Label/Color	Description
WIC/VIC slot	SLOT 0	Supports either a Cisco WIC or VIC. For detailed information, refer to the <i>Cisco WAN Interface Cards Hardware Installation Guide</i> that comes with every card.
WIC/VIC slot	SLOT 1	Supports either a Cisco WIC or VIC. For detailed information, refer to the <i>Cisco WAN Interface Cards Hardware Installation Guide</i> that comes with every card.
VIC slot	SLOT 2	Supports one Cisco VIC. For detailed information, refer to the <i>Cisco WAN Interface Cards Hardware Installation Guide</i> that comes with every card.
Power socket	+5, +12, –12 VDC	Router connection to the external power supply.
Protective earth	Ground wire	Router connection to earth ground by using a green and yellow 14 AWG ground wire.

Use the rear-panel LEDs during router installation to confirm that you have correctly connected all cables to the router.

**Table 3**    *Rear Panel LEDs*

LED Label	Color	Description
FDX	Green	On—Ethernet port is operating in full-duplex mode. Off—Ethernet port is operating in half-duplex mode.
100	Green	On—Ethernet port is operating at 100 Mbps. Off—Ethernet port is operating at 10 Mbps.
LINK	Green	On when the Ethernet link is up.
SLOT 0 OK	Green	On when either a WIC or VIC is correctly inserted in the card slot.
SLOT 1 OK	Green	On when either a WIC or VIC is correctly inserted in the card slot.

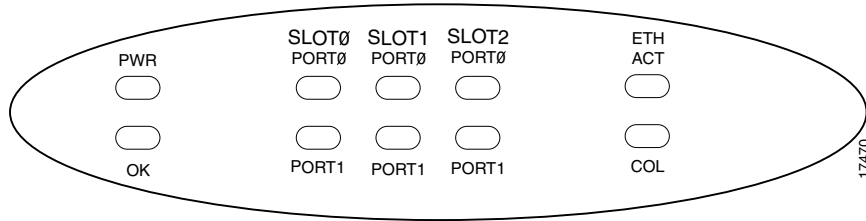
**Table 3**     *Rear Panel LEDs (continued)*

LED Label	Color	Description
SLOT 2 OK	Green	On when a VIC is correctly inserted in the card slot.
PVDM OK	Green	On when a packet voice data module (PVDM) is correctly inserted in the card slot.

## Front-Panel LEDs

Use the router front-panel LEDs to determine network activity and status on the Ethernet port and on the WIC and VIC ports. The front-panel LEDs are illustrated in Figure 3 and described in Table 4.

**Figure 3**     *Front-Panel LEDs*



**Table 4**     *Front-Panel LEDs*

LED	Color	Cards Supported	LED Meaning
PWR	Green	—	On when DC power is being supplied to the router.
OK	Green	—	On when the router has successfully booted up and the software is functional. This LED blinks during the power-on self-test (POST).  Refer to the “OK LED Diagnostics” section in the “Troubleshooting” chapter for information on how to use this LED for router diagnostics.
ETH			

**Table 4**    *Front-Panel LEDs (continued)*

LED	Color	Cards Supported	LED Meaning
ACT	Green	–	Blinks when there is network activity on the Ethernet port.
COL	Yellow	–	Blinks when there are packet collisions on the local Ethernet network.
SLOTØ			
PORTØ	Green	ISDN	On when the first ISDN B channel is connected.
		Serial and CSU/DSU	Blinks when data is being sent to or received from the port.
		2-port serial	
		VIC-2E&M	
		VIC-2FXO	
		VIC-2FXS	
PORT1	–	Serial and CSU/DSU	Off.
	Green	ISDN	On when the first ISDN B channel is connected.
		2-port serial	Blinks when data is being sent to or received from the port.
		VIC-2E&M	
		VIC-2FXO	
		VIC-2FXS	

**Table 4**     *Front-Panel LEDs (continued)*

LED	Color	Cards Supported	LED Meaning
SLOT1			
PORTØ	Green	ISDN	On when the first ISDN B channel is connected.
		Serial and CSU/DSU	Blinks when data is being sent to or received from the port.
		2-port serial	
		VIC-2E&M	
		VIC-2FXO	
		VIC-2FXS	
PORT1	–	Serial and CSU/DSU	Off.
	Green	ISDN	On when the first ISDN B channel is connected.
		2-port serial	Blinks when data is being sent to or received from the port.
		VIC-2E&M	
		VIC-2FXO	
		VIC-2FXS	
SLOT2			
PORTØ	Green	VIC-2E&M	Blinks when data is being sent to or received from the port.
		VIC-2FXO	
		VIC-2FXS	
PORT1	Green	VIC-2E&M	Blinks when data is being sent to or received from the port.
		VIC-2FXO	
		VIC-2FXS	

# Router Memory

This section describes the types of memory stored in the router and how to find out how much of each the router has.

For instructions on how to upgrade memory in the router, refer to the “Installing and Upgrading Memory and Data Modules” appendix in this guide.

## Types of Memory

The router has the following types of memory:

- **Dynamic RAM (DRAM)**—This is the main storage memory for the router. DRAM is also called working storage and contains the dynamic configuration information. The router stores a working copy of Cisco IOS software, dynamic configuration information, and routing table information in DRAM.
- **Nonvolatile RAM (NVRAM)**—This type of memory contains the startup configuration.
- **Flash memory**—This special kind of erasable, programmable memory contains a copy of the Cisco IOS software. The Flash memory structure can store multiple copies of the Cisco IOS software. You can load a new level of the operating system in every router in your network and then, when convenient, upgrade the whole network to the new level. The Flash memory on the router is stored on mini-Flash modules.

## Amounts of Memory

Use the **show version** command to view the amount of DRAM, NVRAM, and Flash memory stored in your router. The following example shows the output of the **show version** command. The bold text displays the amount of memory stored in this router.

```
1750# show version
Cisco Internetwork Operating System Software
IOS (tm) C1700 Software (C1700-SV3Y-M), Experimental Version
12.0(19980308:184442) [syaji-grammy-v6 189]
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Mon 22-Mar-99 12:58 by syaji
Image text-base: 0x80008088, data-base: 0x806B2BB8

ROM: System Bootstrap, Version 12.0(1)XA1,RELEASE SOFTWARE (fc1)

Router uptime is 15 minutes
System restarted by power-on
System image file is "flash:syaji/c1700-sv3y-mz"

cisco 1750 (MPC860) processor (revision 0x00) with 24576K/8192K bytes
of memory.
Processor board ID 0000 (1314672220), with hardware revision 0000
M860 processor: part number 0, mask 32
Bridging software.
X.25 software, Version 3.0.0.
1 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
2 Voice FXS interface(s)
2 Voice E & M interface(s)
32K bytes of non-volatile configuration memory.
8192K bytes of processor board System flash (Read/Write)

Configuration register is 0x0
```



## Unpacking the Router

Table 1-5 lists the items that come with your router. All these items are in the accessory kit that is inside the box that your router came in.

**Table 1-5 Router Box Contents**

• Power cord (black)
• Power supply
• DB-25 to DB-9 adapter
• Console cable, RJ-45 to DB-9 (light blue)
• Product documentation

## Additional Required Equipment

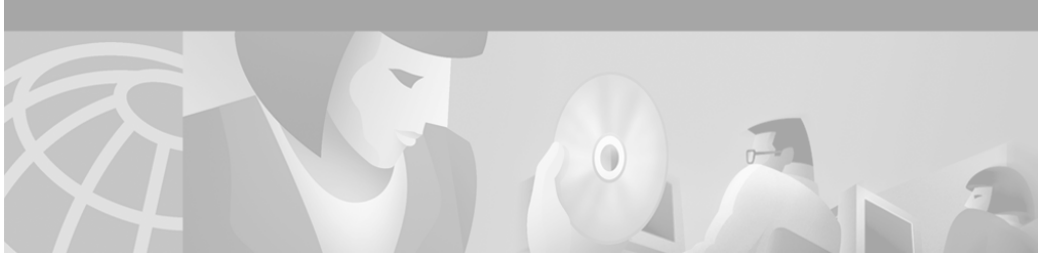
Depending on your local network and which Cisco WICs and VICs you install in your router, you might need other items listed in Table 6 to complete your router installation.

**Table 6 Additional Required Equipment**

Equipment	When You Use It
Ethernet hub	A hub connects pieces of network equipment (including the router) to create a network. You can use a 10-, 100-, or 10/100-Mbps hub with the router.
Ethernet switch	A switch connects pieces of network equipment (including the router) to create a network. You can use a 10-, 100-, or 10/100-Mbps switch with the router.
Phillips screwdriver	Although the WICs and VICs use thumbscrews, you might need a Phillips screwdriver to loosen the WIC and VIC cover.
Cisco WIC	To make a WAN connection, the router must have a supported WIC installed. The router supports up to two cards. You can either order the cards when ordering the router, and they will be installed for you, or you can order the cards separately, after receiving the router, and install them yourself.

**Table 6**     **Additional Required Equipment (continued)**

Equipment	When You Use It
Cisco VIC	To make a voice connection, the router must have a supported VIC installed. The router supports up to three cards. You can either order the cards when ordering the router, and they will be installed for you, or you can order the cards separately, after receiving the router, and install them yourself.
Straight-through RJ-45-to-RJ-45 cable	This cable connects the router to the Ethernet LAN and the WICs to various WAN services, including ISDN, T1/FT1, and 56-kbps services. You will need one cable for each of these connections.
Standard RJ-11 telephone cable	This cable connects the VIC to a telephone, fax machine, or a telephone wall-jack. You will need one cable for each of these connections.
Standard RJ-48 telephone cable	This cable connects the VIC to a PBX trunk line. You will need one cable for each of these connections.
Serial cable	This cable connects a serial card to serial services. You must order this cable from Cisco. For detailed information about serial cable types, refer to the <i>Cisco WAN Interface Cards Hardware Installation Guide</i> that comes with every card.
NT1	Some ISDN service providers require a Network Termination 1 device to connect an ISDN S/T port to the ISDN line.
Asynchronous modem	To configure the router from a remote location, connect a modem to the AUX port on the router.



# 2

## Installation

---

This chapter provides the installation procedures for the router in the following sections:

- Before Installing the Router
- Connecting the Router to Your Local Network
- Installing WICs and VICs
- Connecting Power to the Router
- Verifying Your Installation
- Optional Installation Steps

### Before Installing the Router

The router is shipped ready for desktop mounting. Before making the power and network connections, simply set the router on a desktop, shelf, or other flat surface.

**Note**

---

For instructions on wall-mounting the router, refer to the “Wall-Mounting” section later in this chapter.

---

Be sure to read the safety information in the *Regulatory Compliance and Safety Information for the Cisco 1600 and Cisco 1700 Routers* document that came with your router.



**Warning**

**Read the installation instructions before you connect the system to its power source.**



**Warning**

**This equipment needs to be grounded. Use a green and yellow 14 AWG ground wire to connect the host to earth ground during normal use.**



**Warning**

**Do not work on the system or connect or disconnect cables during periods of lightning activity.**



**Caution**

Do not place anything on top of the router that weighs more than 10 pounds (4.5 kg). Excessive weight on top of the router could damage the chassis.

## Connecting the Router to Your Local Network

The router is connected to your local Ethernet network through the yellow 10/100 Ethernet port. You must provide the following items for this connection:

- A straight-through, RJ-45-to-RJ-45 Ethernet cable
- A 10/100-Mbps Ethernet hub or switch



**Warning**

**The ports labeled *10/100-Mbps Ethernet port* and *Console port* are safety extra-low voltage (SELV) circuits. SELV circuits should only be connected to other SELV circuits. Because BRI circuits are treated like telephone-network voltage, avoid connecting the SELV circuits to the telephone network voltage (TNV) circuits. (To**

see translated versions of this warning, refer to the *Regulatory Compliance and Safety Information for the Cisco 1600 and Cisco 1700 Routers* document that came with the router.)

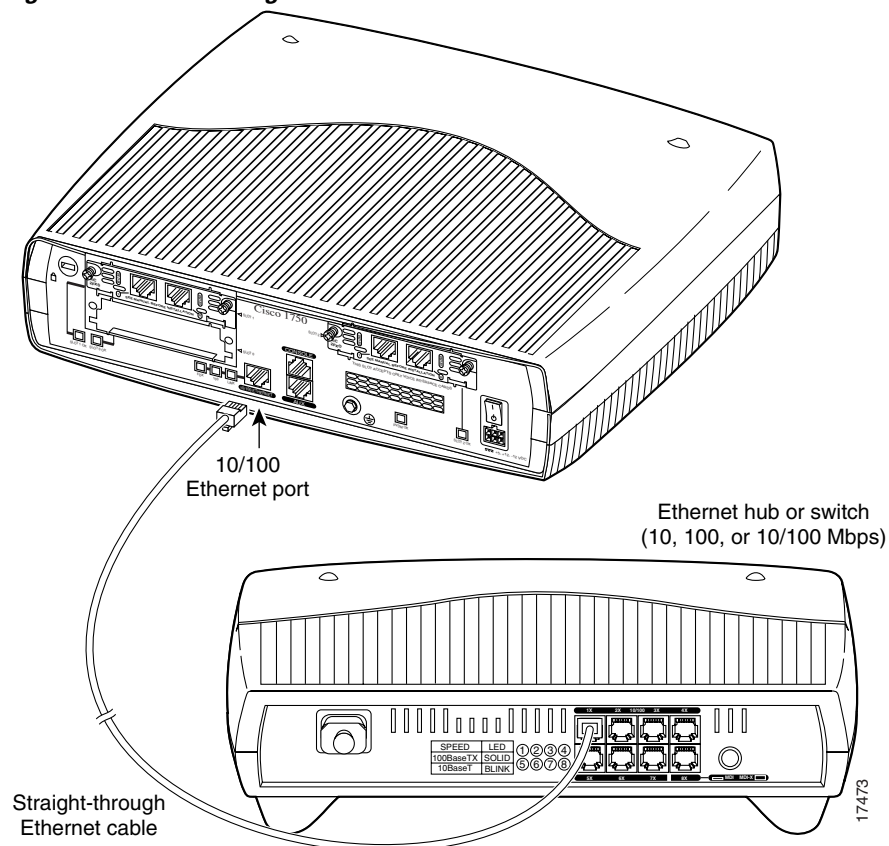
**Caution**

Always connect the Ethernet cable to the yellow ports on the router. Do not connect the cable to an ISDN S/T or U port on a WIC or to an NT1 that is connected to a WIC. Accidentally connecting the cable to the wrong port can damage your router.

Follow these steps to connect the router to your local network:

- Step 1** Connect one end of the cable to the yellow Ethernet port (labeled *10/100-Mbps Ethernet port*).
- Step 2** Connect the other end of the cable to a network port on the hub or switch.

**Figure 1** Connecting the Router to the Local Network



## Installing WICs and VICs

The router supports one to two Cisco WICs and one to three Cisco VICs. Each WIC has one or two WAN ports and each VIC has one or two voice ports. This section describes the procedure for installing a WIC or a VIC in the router.

**Note**

For details on specific WICs and VICs, how to connect a WIC to the WAN line or VIC to the telephone and fax line, and how to configure the interface with Cisco IOS software, refer to the *Cisco WAN Interface Cards Hardware Installation Guide* that came with the card(s).

## Safety Information

This section lists safety warnings that you should be aware of before installing WICs or VICs in the router. To see translated versions of these warnings, refer to the *Regulatory Compliance and Safety Information for the Cisco 1600 and Cisco 1700 Routers* document that came with the router.

**Warning**

**Before working on a system that has an on/off switch, turn off the power and unplug the power cord.**

**Warning**

**Only trained and qualified personnel should be allowed to install or replace this equipment.**

**Warning**

**Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.**



**Warning**

---

**Before opening the chassis, disconnect the telephone-network cables (from the card) to avoid contact with the telephone-network voltages.**

---



**Warning**

---

**Do not work on the system or connect or disconnect cables during periods of lightning activity.**

---



**Caution**

---

Do not connect a WAN, telephone or fax cable to the card until you have completed the installation procedure.

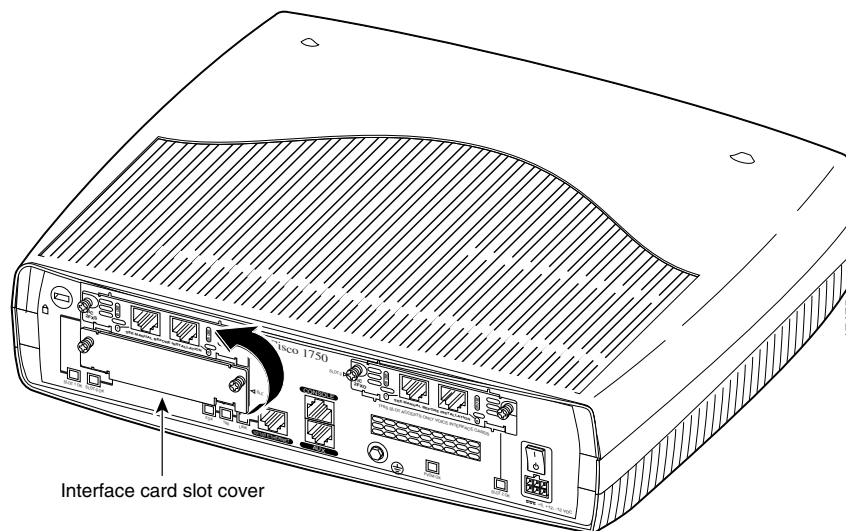
---

Follow these steps to remove and insert a card in the router:

- 
- Step 1** Make sure the router is turned off and is disconnected from the power supply.
- Step 2** Loosen the thumbscrews on the WIC or VIC slot cover on the rear panel, as shown in Figure 2.
- You should be able to loosen the screws using your fingers; however, if the screws are very tight, you might need to use a Phillips screwdriver.

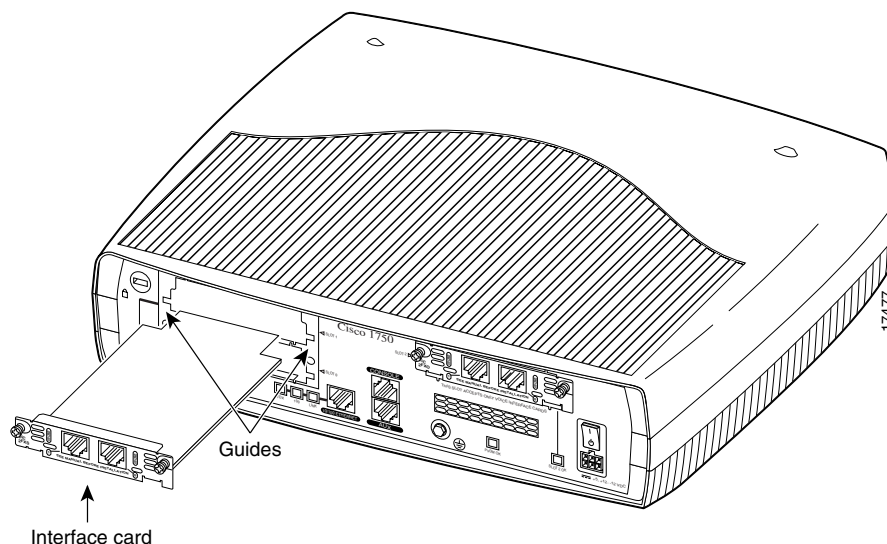


**Figure 2**     *Removing a WIC or VIC Slot Cover*



- Step 3**     Remove the metal plate that covers the card slot.
- Step 4**     Hold the card by the edges on either side of the card front panel, and line up the card edges with the guides inside the card slot, as shown in Figure 3.
- Step 5**     Insert the card in the slot and gently push it into the router until the front panel of the card is flush with the rear panel of the router.
- Step 6**     Tighten the screws.

**Figure 3** Inserting a WIC or VIC in the Router



## Connecting Power to the Router

Read the following warnings before connecting the power to the router.



**Warning**

**The power supply is designed to work with TN power systems.**



**Warning**

**This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120VAC, 15A U.S. (240VAC, 16A international) is used on the phase conductors (all current-carrying conductors).**

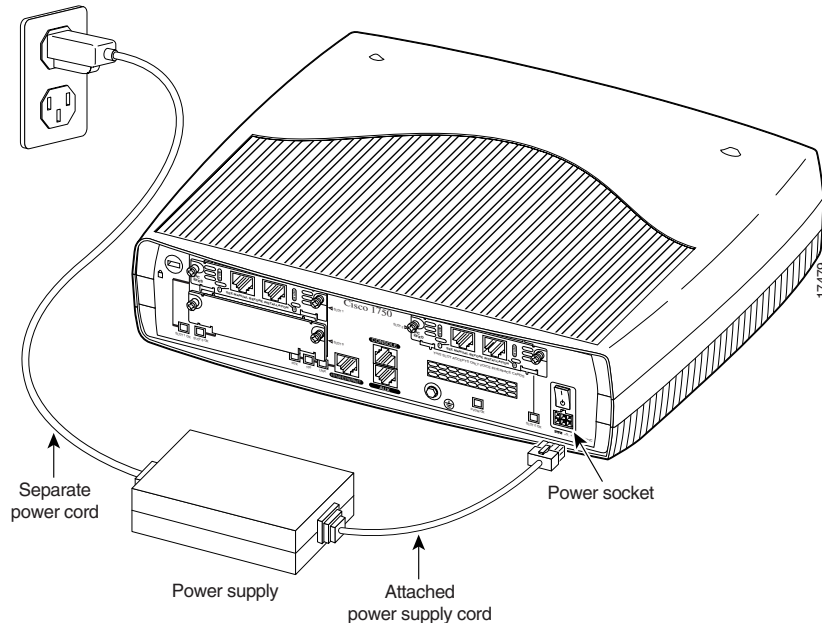
**Warning**

**This equipment needs to be grounded. Use a green and yellow 14 AWG ground wire to connect the host to earth ground during normal use.**

Follow these steps to connect power to the router and to turn the router on:

- Step 1** Connect the attached power-supply cord to the power socket (labeled +5, +12, -12 VDC) on the router rear panel.
- Step 2** Connect one end of the separate power cord to the socket on the power supply.
- Step 3** Connect the other end of the separate power cord to a power outlet.
- Step 4** Press the router power switch to on ( I ).
- Step 5** Confirm that the router has power by checking that the PWR LED on the front panel is on.

**Figure 4** Connecting the Power Supply



## Verifying Your Installation

You can verify that you have correctly installed the router by checking the following LEDs:

- PWR (front panel)—On when power is being supplied to the router.
- OK (front panel)—On when the router software is loaded and functional. Blinking means that the router is performing a power-on self-test (POST).
- ETH ACT (front panel)—Blinking when there is network traffic on the local Ethernet LAN.
- SLOTØ, SLOT1, and SLOT2 (front panel)—Activity on PORTØ and PORT1 of each of these slots varies, depending on the type of WIC or VIC installed. Refer to Table 4 in the “Cisco 1750 Router Overview” chapter for detailed information on activity at different ports.
- SLOT 0 and SLOT 1 OK (rear panel)—On when a WIC or VIC is correctly installed in the slot.
- SLOT 2 OK (rear panel)—On when a VIC is correctly installed in the slot.
- LINK (rear panel)—On when the router is correctly connected to the local Ethernet LAN through the 10/100-Mbps Ethernet port.

## Optional Installation Steps

This section describes the following installation steps that you might or might not use, depending on your site and how you are configuring the router:

- Connecting a PC
- Connecting a Modem
- Wall-Mounting

## Connecting a PC

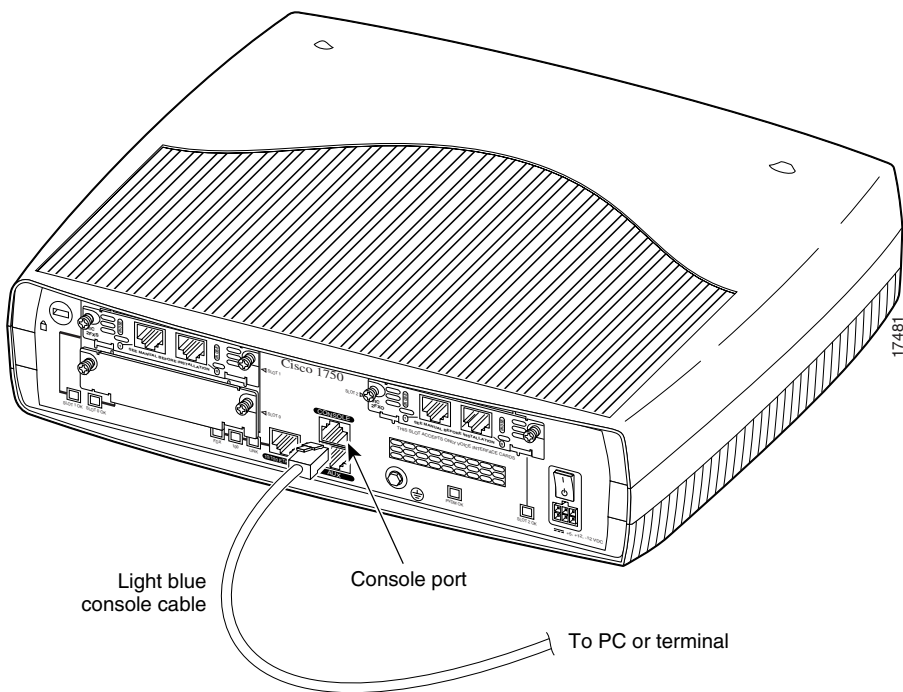
If you want to configure the router through the Cisco IOS command-line interface (CLI), you must connect the router console port to a terminal or PC. The cable and adapter required for this connection are included with the router.

To configure the router with a PC, the PC must have some type of terminal emulation software installed. The software should be configured with the following parameters: 9600 baud, 8 data bits, no parity, 1 stop bit, no flow control. Refer to the *Cisco 1700 Router Software Configuration Guide* for detailed information about configuring the router using Cisco IOS software.

Follow these steps to connect the router to a terminal or PC:

- 
- Step 1** Connect the light blue console cable to the blue *Console port* on the router, as shown in Figure 5.
  - Step 2** Use the console adapter to connect the other end of the cable to the terminal or PC. If your terminal or PC has a console port that does not fit the adapter included with the router, you must provide the correct adapter for that port.

**Figure 5** Connecting the Console Cable to the Router



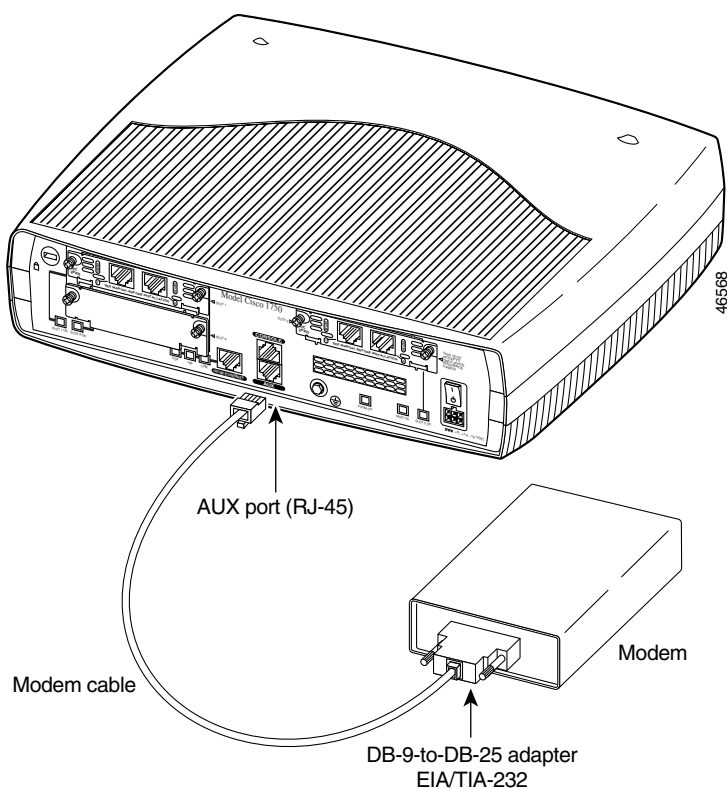
## Connecting a Modem

When a modem is connected to the auxiliary port, a remote user can dial into the router and configure it. You can use the light blue console cable that came in the accessory kit. If you are using the light blue cable with the console port, you can use any crossover RJ-45-to-RJ-45 cable.

Follow these steps to connect a modem to the router:

- Step 1** Connect one end of the cable to the black AUX port on the router rear panel.
- Step 2** Connect the adapter labeled *Modem* to the other end of the cable.
- Step 3** Connect the DB-25 end of the adapter to the modem.

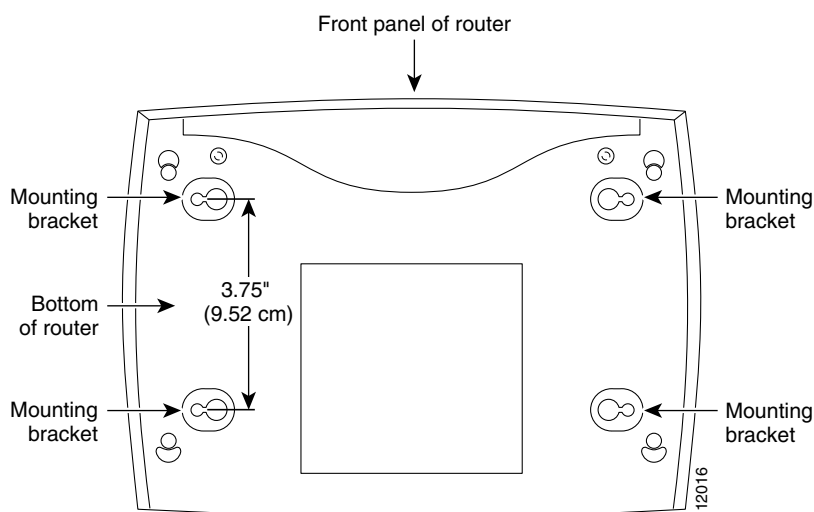
**Figure 6** Connecting a Modem to the Router



## Wall-Mounting

The router can be wall-mounted using two number 6, 3/4-inch screws and the molded mounting brackets on the bottom of the hub. You must provide the screws. We recommend using pan-head or round-head screws.

**Figure 7** Wall-Mount Brackets—Bottom of Router



Follow these steps to mount the router on a wall or other surface:

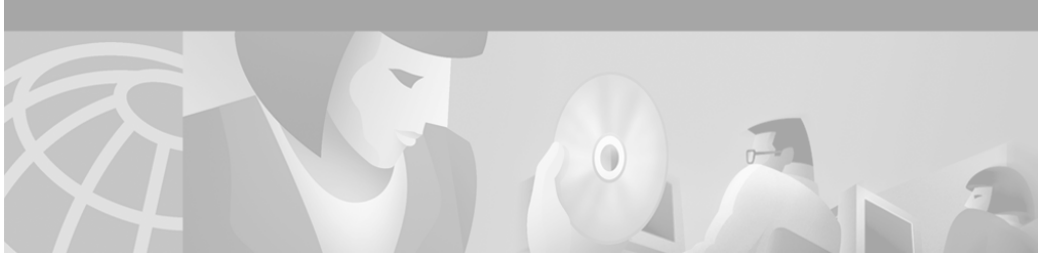
- 
- Step 1** Install the two screws 3.75 inches (9.52 centimeters) horizontally apart on a wall or other vertical surface.
- The screws should protrude 0.25 inches (0.64 centimeters) from the surface of the wall.
- Step 2** Hang the router on the screws with either the left side or right side mounting brackets so that
- The LEDs are visible to the user. The LEDs indicate the router operating status, so the LEDs should be easily visible.
  - The power supply does not hang from its cable. If the power supply is not supported, it might disconnect from the cable that connects it to the router.



**Caution**

If you install the screws in drywall, use hollow wall anchors (1/8 inch by 5/16 inch) to secure the screws. If the screws are not properly anchored, the strain of the cables connected to the router rear-panel connectors could pull the router from the wall.





# 3

## Troubleshooting

---

Use the information in this chapter to help isolate problems you might encounter with the router or to rule out the router as the source of the problem.

This chapter contains the following sections:

- Contacting Cisco or Your Reseller
- Recovering a Lost Password
- Problem Solving

### Contacting Cisco or Your Reseller

If you cannot locate the source of a problem, contact your local reseller for advice. Before you call, you should have the following information ready:

- Chassis type and serial number
- Maintenance agreement or warranty information
- Cisco IOS release installed on your router
- Date you received the router
- Brief description of the problem
- Brief description of the steps you have taken to isolate the problem

- Output from the **show tech-support** command

## Recovering a Lost Password

This section describes how to recover a lost enable or enable secret password. The process of recovering a password consists of the following major steps:

- Changing the Configuration Register
- Resetting the Router
- Resetting the Password (for lost enable secret passwords only)
- Resetting the Configuration Register Value

**Note**

---

See the “Hot Tips” section on Cisco Connection Online (CCO) for additional information on replacing enable secret passwords.

---

## Changing the Configuration Register

Follow these steps to change the configuration register:

- 
- |               |   |
|---------------|---|
| <b>Step 1</b> | Connect an ASCII terminal or a PC running a terminal-emulation program to the console port on the rear panel of the router. Refer to the section “Connecting a PC” in the “Installation” chapter. |
| <b>Step 2</b> | Configure the terminal to operate at 9600 baud, 8 data bits, no parity, and 1 stop bit.   |
| <b>Step 3</b> | Reboot the router by pressing the power switch to the off position, and then to the on ( I ) position.  |

- Step 4** At the user EXEC prompt (Router>), enter the **show version** command to display the existing configuration register value (shown in bold in this example output):

```
Router> show version
Cisco Internetwork Operating System Software
IOS (tm) C1700 Software (C1700-SV3Y-M), Experimental Version
12.0(19980308:184442) [syaji-grammy-v6 189]
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Mon 22-Mar-99 12:58 by syaji
Image text-base: 0x80008088, data-base: 0x806B2BB8

ROM: System Bootstrap, Version 12.0(1)XA1,RELEASE SOFTWARE (fc1)

Router uptime is 15 minutes
System restarted by power-on
System image file is "flash:syaji/c1700-sv3y-mz"

cisco 1750 (MPC860) processor (revision 0x00) with 24576K/8192K bytes
of memory.
Processor board ID 0000 (1314672220), with hardware revision 0000
M860 processor: part number 0, mask 32
Bridging software.
X.25 software, Version 3.0.0.
1 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
2 Voice FXS interface(s)
2 Voice E & M interface(s)
32K bytes of non-volatile configuration memory.
8192K bytes of processor board System flash (Read/Write)
```

**Configuration register is 0x0**

- Step 5** Record the setting of the configuration register. It is usually 0x0.
- Step 6** Record the break setting.
- Break enabled—bit 8 is set to 0.
  - Break disabled (default setting)—bit 8 is set to 1.

## Resetting the Router

Follow these steps to reset the router:

- Step 1** Do one of the following:
- If break is enabled, go to Step 2.
  - If break is disabled, turn the router off, wait 5 seconds, and turn it on again. Within 60 seconds, press the **Break** key. The terminal displays the ROM monitor prompt. Go to Step 3.



**Note** Some terminal keyboards have a key labeled Break. If your keyboard does not have a Break key, refer to the documentation that came with the terminal for instructions on how to send a break. To send a break in Windows HyperTerminal, enter Ctrl-Break.

- Step 2** Send a break. The terminal displays the following prompt:

```
rommon 2>
```

- Step 3** Enter **confreg 0x142** to reset the configuration register:

```
rommon 2> confreg 0x142
```

- Step 4** Initialize the router by entering the **reset** command:

```
rommon 2> reset
```

The router resets, and the configuration register is set to 0x142. The router boots the system image in Flash memory and displays the following:

```
--- System Configuration Dialog ---
```

- Step 5** Enter **no** in response to the prompts until the following message is displayed:

```
Press RETURN to get started!
```

- Step 6** Press **Return**. The following prompt appears:

```
Router>
```

- Step 7** Enter the **enable** command to enter privileged EXEC mode. Configuration changes can be made only in this mode.

```
Router> enable
```

The prompt changes to the privileged EXEC prompt:

```
Router#
```

- Step 8** Enter the **show startup-config** command to display an enable password in the configuration file:

```
Router# show startup-config
```

- Step 9** Enter the **copy startup-config running-config** command to return to your startup configuration:

```
Router# copy startup-config running-config
```

If you are recovering an enable password, skip the following “Resetting the Password” section, and complete the password recovery process by performing the steps in the next section, “Resetting the Configuration Register Value.”

If you are recovering an enable secret password, you will not see the display in the **show startup-config** command output. Complete the password recovery process by performing the steps in the following “Resetting the Password” section.

## Resetting the Password

Follow these steps to reset the password:

- 
- Step 1** Enter the **configure terminal** command to enter configuration mode:

```
Router# configure terminal
```

- Step 2** Enter the **enable secret** command to reset the enable secret password in the router:

```
Router(config)# enable secret <gobbledegook>
```

- Step 3** Enter the **config-register** command and the original configuration register value that you recorded in Step 5 in the “Changing the Configuration Register” section earlier in this chapter.

**Step 4** Press **Ctrl-Z** to exit configuration mode.

```
Router(config)# Ctrl-Z
```

**Step 5** Save your configuration changes:

```
Router# copy running-config startup-config
```

## Resetting the Configuration Register Value

Follow these steps once you have recovered or reconfigured a password:

**Step 1** Enter the **configure terminal** command to enter configuration mode:

```
Router# configure terminal
```

**Step 2** Enter the **config-register** command and the original configuration register value that you recorded in Step 5.

**Step 3** Press **Ctrl-Z** to exit configuration mode:

```
Router(config)# Ctrl-Z
```

**Step 4** Reboot the router, and enter the recovered password.

## Problem Solving

The key to problem solving is to isolate the problem to a specific subsystem by comparing what the router is doing to what it should be doing.

When problem solving, consider the following subsystems of the router:

- **WICs and VICs**—Refer to the LEDs on the cards and the LEDs on the router front panel to help identify a failure. For more information on WICs and VICs, refer to the *Cisco WAN Interface Cards Hardware Installation Guide* that comes with each card.
- **Cables**—Check all the external cables that connect the router to the network.
- **Power system**—Check the external power source, power cable, router power supply, and circuit breaker. Check for inadequate ventilation or air circulation that might cause overheating.



- ISDN configuration—Consider ISDN-specific hardware and software configurations (ISDN BRI WICs only).

## OK LED Diagnostics

Use the front-panel OK LED to help determine any problems with the router. When the router first boots up, it performs a power-on self-test (POST). If the router detects a problem during the POST, the OK LED blinks in a different pattern (described in Table 1), depending on the problem. A pattern is a specific number of blinks that is repeated until the router is turned off. If the router experiences any of these problems, contact your Cisco reseller.

**Table 1**     *OK LED Blinking Patterns*

Number of Blinks	Meaning
2	The 860T dual-port RAM (DPRAM) failed.
3	The parameter RAM area of the 860T DPRAM failed.
4	The 860T system protection control register has a write failure.
5	The router cannot detect the dynamic RAM (DRAM).
6	The user programmable machine has a write failure.
9	The router DRAM failed.

## Troubleshooting WICs and VICs

Use the **show diag** command to help determine problems with a card.

```
Router#show diag
Slot 0:
C1750 1FE VE Mainboard port adapter, 7 ports
Port adapter is analyzed
Port adapter insertion time unknown
EEPROM contents at hardware discovery:
Hardware revision 0.0 Board revision UNKNOWN
Serial number 1314672220 Part number 00-0000-00
Test history 0x0 RMA number 00-00-00
0x20:01 C9 00 00 4E 5C 4E 5C 00 00 00 00 00 00 00 00
0x30:00 00 00 04 00 00 00 00 00 00 00 00 00 00 00 00
WIC Slot 0:
Serial 2A/S (12in1) WAN daughter card
Hardware revision 1.0 Board revision A0
Serial number 0007947084Part number 800-03182-01
Test history 0x00 RMA number 00-00-00
Connector type PCI
EEPROM format version 1
EEPROM contents (hex):
0x20: 01 13 01 00 00 79 43 4C 50 0C 6E 01 00 00 00 00
0x30: 50 00 00 00 98 04 17 17 FF FF FF FF FF FF FF FF
WIC Slot 1:
Dual FXS Voice Interface Card WAN daughter card
Hardware revision 1.1 Board revision C0
Serial number 0009907586 Part number 800-02493-01
Test history 0x00 RMA number 00-00-00
Connector type WAN Module
EEPROM format version 1
EEPROM contents (hex):
0x20: 01 0E 01 01 00 97 2D 82 50 09 BD 01 00 00 00 00
0x30: 60 00 00 00 98 08 22 01 FF FF FF FF FF FF FF FF
```

The **show diag** command displays similar information for each port available on the router.

Table 2 lists problems that could occur with the WICs and VICs and the possible solutions of these problems.

**Table 2 Troubleshooting WICs and VICs**

Symptom	Possible Solution(s)
Router does not recognize the card.	<ul style="list-style-type: none"> <li>Confirm that the Cisco IOS release installed in the router supports the WIC or VIC.</li> <li>Make sure you have a Cisco IOS feature set that supports voice. The <i>Cisco WAN Interface Cards Hardware Installation Guide</i> lists the software requirements for each card.</li> <li>Make sure that the card is correctly installed in the router. Refer to the “Installing WICs and VICs” section in the “Installation” chapter.</li> </ul>
Router recognizes the card(s), but the card port(s) do not initialize.	<ul style="list-style-type: none"> <li>Make sure that the card is correctly installed in the router. Refer to the “Installing WICs and VICs” section in the “Installation” chapter.</li> <li>Check the external cable connections to make sure they are secure.</li> </ul>
Router does not boot properly or continuously or intermittently reboots.	Make sure that the WIC or VIC is correctly installed in the router. Refer to the “Installing WICs and VICs” section in the “Installation” chapter.
Router does not boot or reset after the WIC or VIC is inserted.	There might be a short. Turn off the router immediately.
Router boots, but the console screen is frozen.	<ul style="list-style-type: none"> <li>Make sure the console cable is securely connected to the router and to the PC or terminal.</li> <li>Verify that the parameters for your terminal are set to the following: <ul style="list-style-type: none"> <li>9600 baud</li> <li>8 data bits</li> <li>No parity</li> <li>1 stop bit</li> <li>no flow control</li> </ul> </li> </ul>

**Table 2**     *Troubleshooting WICs and VICs (continued)*

Symptom	Possible Solution(s)
Router powers on and boots only when a particular WIC or VIC is removed from the router.	<ul style="list-style-type: none"> <li>Confirm that the Cisco IOS release installed in the router supports the WIC or VIC. The <i>Cisco WAN Interface Cards Hardware Installation Guide</i> lists the software requirements for each card.</li> <li>The router might be overheating. Contact your Cisco reseller.</li> </ul>
Router powers on and boots only when a particular cable is disconnected.	There might be a problem with the WIC or VIC cables. Consult your Cisco reseller for warranty information.

## Troubleshooting the Power System

If the router external power supply fails, return it to your Cisco reseller. Table 3 lists symptoms and possible solutions of power problems.

**Table 3**     *Troubleshooting the Power System*

Symptom	Possible Solution(s)
Router shuts down after being on for a short time.	<ul style="list-style-type: none"> <li>Make sure that the area in which the router is installed meets the environmental site requirements in the “Technical Specifications” appendix in this guide and in the “Site Requirements” section in the <i>Regulatory Compliance and Safety Information for the Cisco 1600 and Cisco 1700 Routers</i> document that came with your router.</li> <li>Make sure nothing is blocking the fan vent on top of the router.</li> <li>If the front-panel PWR LED is not on, the power supply has failed.</li> </ul>
The router attempts to boot, but all LEDs remain off.	The power supply has failed. Return the router to your Cisco reseller.

**Table 3**     *Troubleshooting the Power System*

Symptom	Possible Solution(s)
The router is on, but the front-panel PWR LED is off.	The power supply has failed. Return the router to your Cisco reseller.
The front-panel PWR LED is on, the front-panel OK LED is off, and the router does not pass console or EIA data.	The power supply has failed. Return the router to your Cisco reseller.

## Troubleshooting ISDN

Because ISDN uses many variables and supports many different configurations, it sometimes can cause problems for the router. This section describes problems related to the ISDN line that might occur.

Two commands are useful when troubleshooting ISDN:

- For routers with an ISDN S/T WIC, enter the **clear interface** command to terminate any active ISDN calls and to reset the ISDN BRI interface. Do this for each ISDN port installed in the router:

```
Router# clear interface bri0
Router# clear interface bri1
```

- For routers with an ISDN U WIC, use the **clear controller** command to terminate any active ISDN calls, to reset the ISDN BRI interface, and to reset the ISDN line between the router and the central office switch. Do this for each ISDN port installed in the router:

```
Router# clear controller bri0
Router# clear controller bri1
```

Table 4 lists troubleshooting methods for ISDN-specific problems that might occur.

**Table 4 Troubleshooting ISDN**

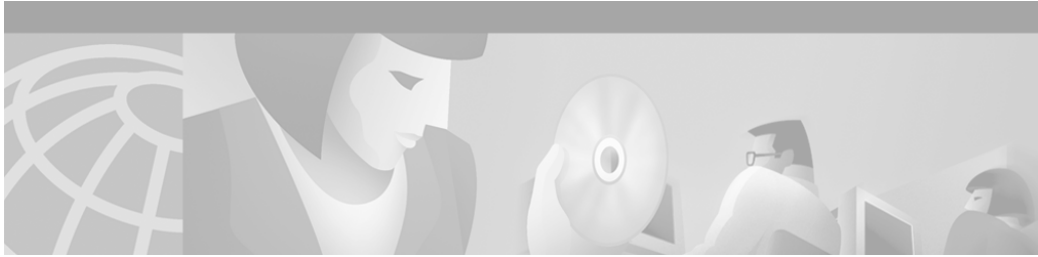
WIC	Symptom	Check the Following	Possible Solution(s)
ISDN S/T	Router is on, but the OK LED on the card is off.	• Is the OK LED on the router front panel on?	• If no, the router might be malfunctioning. Contact your Cisco reseller.
		• Are all ISDN cables properly connected?	• If yes, the ISDN line might be malfunctioning. Check with your ISDN service provider.
		• Is the NT1 LED on?	• If no, the NT1 might be malfunctioning.
ISDN U	Router is on, but the NT1 LED on the card is off.	• Is the OK LED on?	• If no, the router might be malfunctioning. Contact your Cisco reseller.
		• Are all ISDN cables properly connected?	• If yes, the ISDN line might be malfunctioning. Check with your ISDN service provider.
		• Is the ISDN line connected to the card ISDN U port?	• If yes, the ISDN line might be malfunctioning. Check with your ISDN service provider.

**Table 4**    *Troubleshooting ISDN (continued)*

WIC	Symptom	Check the Following	Possible Solution(s)
ISDN S/T or ISDN U	Card cannot make a connection to the remote router.	Use <b>show isdn status</b> command to check the following:	
		<ul style="list-style-type: none"> <li>Does the current ISDN switch type match actual switch type being used?</li> </ul>	<ul style="list-style-type: none"> <li>Use the <b>isdn switch-type</b> command to configure correct switch type.</li> </ul>
		<ul style="list-style-type: none"> <li>Is Layer 1 status deactivated?</li> </ul>	<ul style="list-style-type: none"> <li>Use the <b>show controller bri0</b> command to check for the messages CO RUNNING LOOPBACK TESTS or CO TESTING. If you receive these messages, contact the service provider.</li> </ul>
		<ul style="list-style-type: none"> <li>If Layer 1 status is active, does Layer 3 status say “2 Active Layer 3 calls”?</li> </ul>	<ul style="list-style-type: none"> <li>Router might have called itself. Check destination phone number configured with the <b>dialer map</b> command or the <b>dialer string</b> command.</li> </ul>
		<ul style="list-style-type: none"> <li>If Layer 1 status is active, does Layer 3 status say “No Active Layer 3 call(s)”?</li> </ul>	<ul style="list-style-type: none"> <li>Check destination phone number and make sure it matches the remote router phone number. Check route to the destination and make sure it matches the remote router network address.</li> </ul>
		<ul style="list-style-type: none"> <li>If Layer 1 status is active, does Layer 3 status say “1 Active Layer 3 call”?</li> </ul>	<ul style="list-style-type: none"> <li>Check router protocol configurations.</li> </ul>







# A

## Technical Specifications

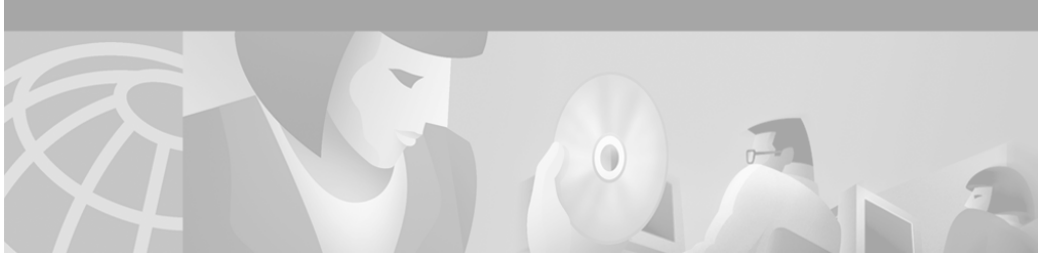
Table 1 lists hardware and operating specifications for the Cisco 1750 router.

**Table 1 Router Specifications**

Description	Specification
Console port	RJ-45
Auxiliary port	RJ-45
Ethernet port	RJ-45
<b>Dimensions</b>	
H x W x D	4 x 11.2 x 8.7 in. (10.16 x 28.45 x 22.10 cm)
<b>Weight</b>	
Weight without the cards	3 lb (1.4 kg)
Weight with three interface cards	3.5 lb (1.75 kg)
<b>Power supply</b>	
External	Universal AC/DC switching—Supplies +5V, +12V, and –12V
On-board	Supplies 3.3V and –5V

**Table 1 Router Specifications (continued)**

Description	Specification
Power consumption	18W
Operating Specifications	
Operating temperature	32 to 104°F (0° to 40°C)
Storage temperature	–40 to 149°F (–20° to 65°C)
Operating humidity	10 to 85%, noncondensing



# B

## Cabling Specifications

---

This appendix describes cables and cabling guidelines for the router and contains the following sections:

- Ethernet Cables
- Ethernet Network Cabling Guidelines
- Console Cable and Adapters
- VIC Cables and Pinouts



### Note

---

For detailed information about cables used with Cisco WICs and VICs, refer to the *Cisco WAN Interface Cards Hardware Installation Guide* that comes with each of the cards.

---

## Ethernet Cables

This section describes the Ethernet cables that are used to connect the router to your local Ethernet network. A 10/100BaseTX router, like the Cisco 1750 router, requires Category 5 unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable. Table 1 describes the pinouts for a RJ-45-to-RJ-45 Ethernet cable.

**Table 1** *Straight-Through Ethernet Cable (RJ-45-to-RJ-45) Pinouts*

RJ-45 Pin <sup>1</sup>	Signal	Direction	RJ-45 Pin
1	TX+	—>	1
2	TX–	—>	2
3	RX+	<—	3
6	RX–	<—	6

1. Pins 4, 5, 7, and 8 are not used for signaling but to reduce radiated cable emissions.

## Ethernet Network Cabling Guidelines

Table 2 describes some guidelines for creating Ethernet networks. Figures might vary, depending on the manufacturer of the network equipment.

**Table 2** *Ethernet Cabling Guidelines*

Specification	10BaseT	100BaseTX
Maximum segment length	100 meters	100 meters
Maximum number of segments per network	5	<ul style="list-style-type: none"> <li>With Class I repeaters: 1</li> <li>With Class II repeaters: 2</li> </ul>

**Table 2 Ethernet Cabling Guidelines (continued)**

Specification	10BaseT	100BaseTX
Maximum hop count <sup>1</sup>	4	<ul style="list-style-type: none"> <li>With Class I repeaters: none</li> <li>With Class II repeaters: 1</li> </ul>
Maximum number of nodes per segment	1024	1024
Cable type required	UTP Category 3, 4, or 5	UTP Category 5 or STP

1. Hop count = Routing metric used to measure the distance between a source and a destination.

## Console Cable and Adapters

A console cable kit is provided with your router. Use this kit when connecting your router to a PC or terminal.

The console cable kit contains:

- RJ-45-to-RJ-45 console cable (light blue)
- DB-9-to-RJ-45 console adapter

Table 2 describes the wiring for the console port, the console cable, and the included adapters. This table also includes pinouts for a DB-9-to-RJ-45 console adapter.

**Table 3 Console Cable and Adapter Pinouts**

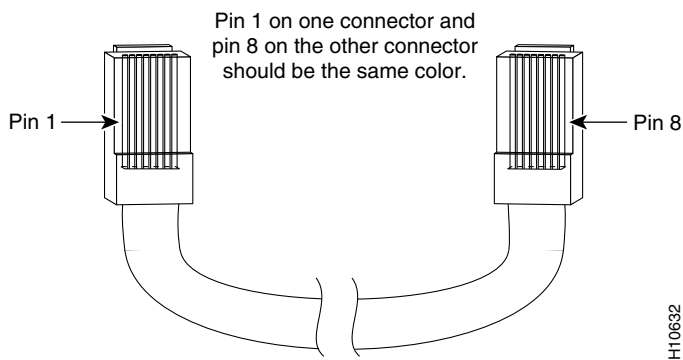
Console (DTE)	Console Port	Console Cable	Adapter	Adapter	Terminal (DTE)
Signal	RJ-45 Pin	RJ-45 Pin	DB-9 Pin	DB-25 Pin	Signal
RTS	1	8	8	5	CTS
DTR	2	7	6	6	DSR

**Table 3** Console Cable and Adapter Pinouts (continued)

Console (DTE)	Console Port	Console Cable	Adapter	Adapter	Terminal (DTE)
Signal	RJ-45 Pin	RJ-45 Pin	DB-9 Pin	DB-25 Pin	Signal
TXD	3	6	2	3	RXD
GND	4	5	5	7	GND
GND	5	4	5	7	GND
RXD	6	3	3	2	TXD
DSR	7	2	4	20	DTR
CTS	8	1	7	4	RTS

Figure 1 illustrates how to identify the console cable, which is also referred to as the *rollover* cable.

**Figure 1** Identifying a Rollover Cable



## VIC Cables and Pinouts

This section describes the VIC cables and pinouts for foreign exchange station (FXS), foreign exchange office (FXO), and E&M connectors. Use the following cables to connect the VICs to the network:

- Standard RJ-11 modular telephone cable to connect FXS VIC ports (color-coded gray) to a telephone or fax machine.
- Standard RJ-11 modular telephone cable to connect FXO VIC ports (color-coded pink) to the PSTN or to a PBX that does not support E&M signaling.
- Standard RJ-48S connector and cable to connect E&M VIC ports (color-coded brown) to a PBX line. The cable wiring depends on the PBX type and connection. For details refer to the *Cisco WAN Interface Cards Hardware Installation Guide*.

Figure 2 shows how to connect the VICs to the network.

**Figure 2 Connecting VICs to the Network**

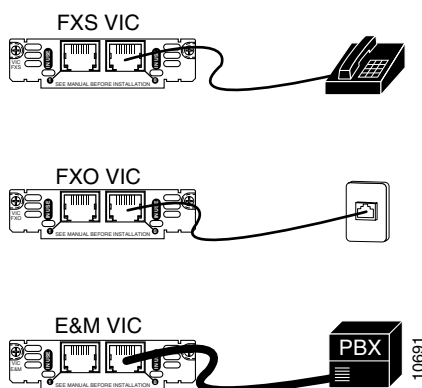


Table 4 lists the pinouts for FXS and FXO VIC connectors.



**Note**

Pins that are not used should not be connected.

**Table 4 RJ-11 Pinout**

Pin	Signal
1	—
2	—
3	Ring
4	Tip
5	—
6	—

The E&M VIC pinout depends on the PBX type and connection. Table 5 lists the pinout for this connector.



**Note**

Pins that are not used should not be connected.

**Table 5 E&M Pinouts**

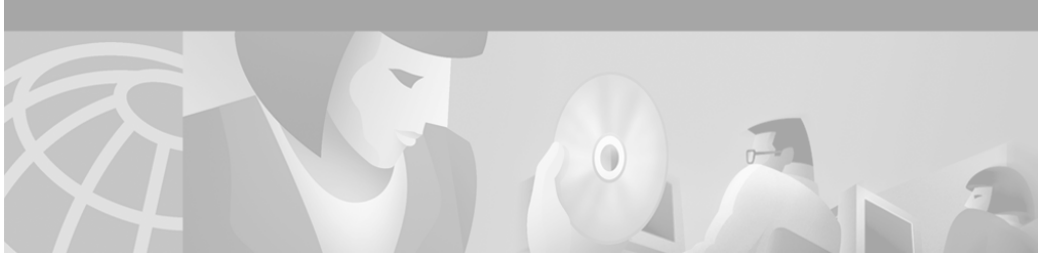
Pin	Signal	Description
1	SB	—48V signaling battery
2	M-lead	Signaling input
3	R	Ring, audio input
4	R or R1	Ring, audio input/output, or output
5	T or T1	Tip, audio input/output, or output
6	T	Tip, audio input



**Table 5**    *E&M Pinouts (continued)*

Pin	Signal	Description
7	E-lead	Signaling output
8	SG	Signaling ground return





# C

## Installing and Upgrading Memory and Data Modules

---

This chapter describes how to install or upgrade memory or data modules in your router and contains the following sections:

- Opening the Chassis
- Locating Modules
- Installing a Mini-Flash Module
- Installing a Dual In-Line Memory Module
- Installing a Packet Voice Data Module
- Closing the Chassis

## Safety Information

This section contains safety information that you should read before installing or upgrading memory in the router.



**Warning**

---

**Before working on a system that has an on/off switch, turn off the power and unplug the power cord.**

---



**Warning**

**Before opening the chassis, disconnect the telephone-network cables to avoid contact with telephone-network voltages.**



**Warning**

**Do not work on the system or connect or disconnect cables during periods of lightning activity.**



**Warning**

**Do not touch the power supply when the power cord is connected. For systems with a power switch, line voltages are present within the power supply even when the power switch is off and the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected.**



**Warning**

**Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.**



**Warning**

**Only trained and qualified personnel should be allowed to install or replace this equipment.**



**Warning**

**Hazardous network voltages are present in WAN ports regardless of whether power to the router is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the router first.**



**Warning**

**During this procedure, wear grounding wrist straps to avoid ESD damage to the router. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.**

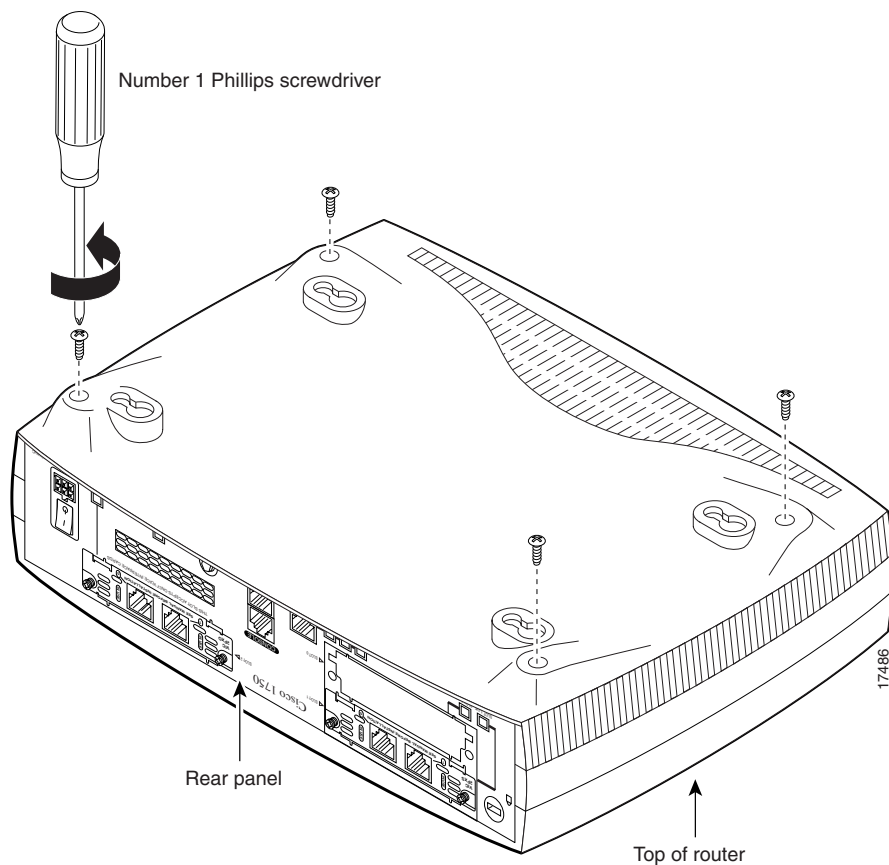
## Opening the Chassis

To install or upgrade memory or data modules, you must open the chassis. Opening the chassis requires a number one Phillips screwdriver.

Follow these steps to open the chassis:

- 
- Step 1** Make sure the router is turned off and is disconnected from the power supply.
  - Step 2** Turn the router upside down, and rest the top of the router on a flat surface.
  - Step 3** Use the Phillips screwdriver to remove the four screws that hold the top and bottom of the chassis together, as shown in Figure 1.
  - Step 4** Turn the router back to its original position (right-side up).

**Figure 1** Removing the Chassis Screws



**Step 5** Gently pull the top of the router (which is facing up toward you) up and away from the bottom of the router (which is resting on the flat surface).

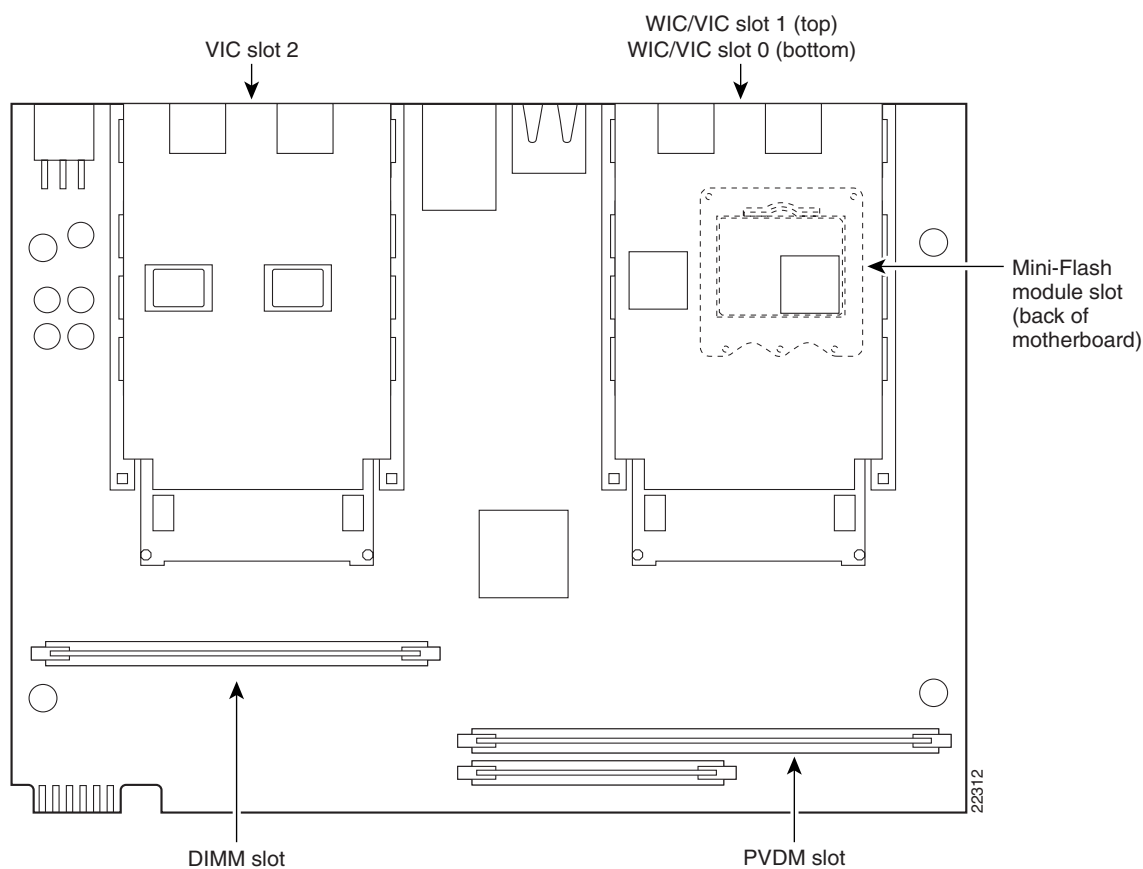
At this point, disconnect the fan, which is inside the top of the router chassis, from the motherboard. Do this by disconnecting the fan cable from the connector (labeled FAN) on the motherboard.

**Step 6** Place the router bottom on an antistatic mat and begin installing memory.

## Locating Modules

Figure 2 shows where to install a dual in-line memory module (DIMM), a packet voice data module (PVDM), and a mini-Flash memory module on the motherboard. The mini-Flash memory module is on the back of the motherboard.

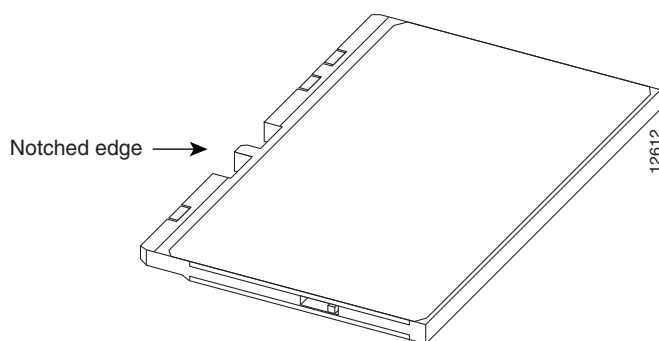
**Figure 2** Cisco 1750 Motherboard—Module Locations



## Installing a Mini-Flash Module

You can install a mini-Flash module (shown in Figure 3) to increase the amount of Flash memory in the router.

**Figure 3** Mini-Flash Module



## Removing a Mini-Flash Module

Follow these steps to remove a mini-Flash memory module:



**Note**

You need to remove the motherboard from the chassis to remove the mini-Flash memory module.



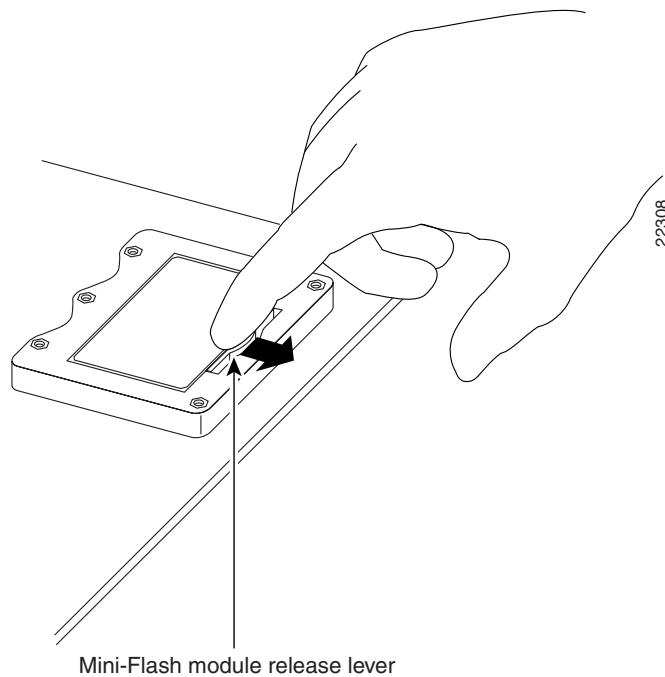
**Warning**

**During this procedure, wear grounding wrist straps to avoid ESD damage to the router. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.**

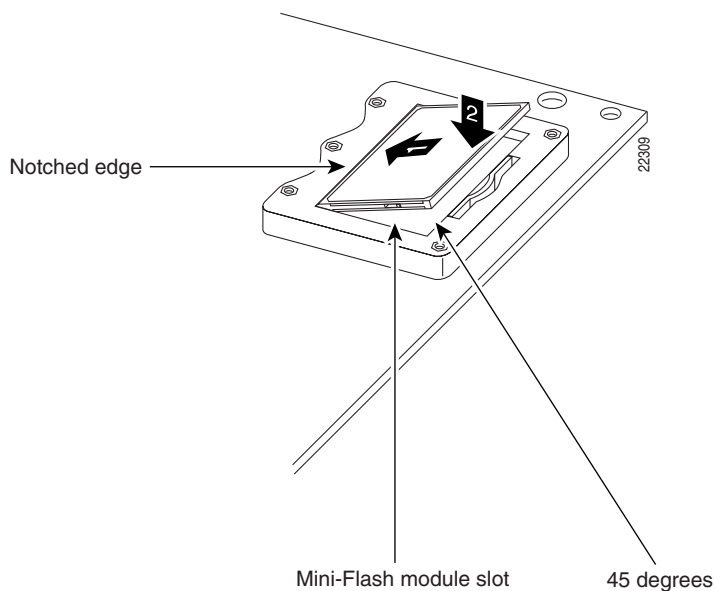


- Step 1** Lift the motherboard from the chassis, turn it upside down, and place it on a flat surface. The mini-Flash memory module is on the back of the motherboard.
- Step 2** Insert your index finger between the mini-Flash memory module and the mini-Flash memory module release lever, as shown in Figure 4.
- Step 3** Firmly pull the release lever away from the module until the module pops up and away from the module slot.

**Figure 4** Removing a Mini-Flash Module



**Figure 5** *Installing a Mini-Flash Module*



Follow these steps to install a mini-Flash memory module on the motherboard:



**Note**

You need to remove the motherboard from the chassis to remove the mini-Flash memory module.

- Step 1** Locate the module slot on the motherboard, shown in Figure 2.
- Step 2** Hold the module with the notched edge away from you.
- Step 3** Insert the module into the module slot at a 45-degree angle, as shown in Figure 5.
- Step 4** Press down firmly on the module until you hear a clicking sound and the module is firmly seated in the slot.
- Step 5** Turn the motherboard back to its original position (right-side up) and place it in the chassis as before.

# Installing a Dual In-Line Memory Module

You can install a dual in-line memory module (DIMM) to increase the amount of dynamic RAM (DRAM) in the router.

Follow these steps to install a DIMM on the router motherboard:

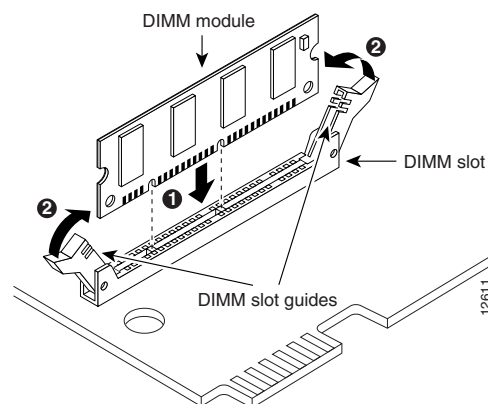


## Warning

**During this procedure, wear grounding wrist straps to avoid ESD damage to the router. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.**

- Step 1** Locate the DIMM slot on the motherboard, shown in Figure 2.
- Step 2** Remove any existing DIMM by pulling the DIMM slot guides (shown in Figure 6) away from the DIMM and down towards the motherboard.
- Step 3** Hold the replacement DIMM with the notched edge away from you and facing the router.
- Step 4** Insert the DIMM into the DIMM slot, making sure that the notches on the edge of the DIMM are inserted over the bars inside the DIMM slot, as in Figure 6.
- Step 5** Press the DIMM firmly into the slot until the slot guides on each side of the slot move up and over the end of the DIMM, as in Figure 6. If the guides do not move up over the edge of the DIMM, move them with your hands.

**Figure 6** Installing a DIMM



## Installing a Packet Voice Data Module

You can install a packet voice data module (PVDM) to support enhanced versions of digital signal processors (DSPs).

Follow these steps to install a PVDM on the router motherboard:

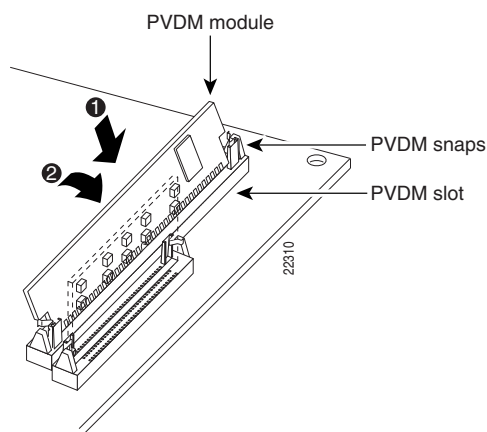


**Warning**

**During this procedure, wear grounding wrist straps to avoid ESD damage to the router. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.**

- Step 1** Locate the PVDM slot on the motherboard, shown in Figure 2.
- Step 2** Remove any existing PVDM by pulling the PVDM snaps (shown in Figure 7) away from the PVDM.
- Step 3** Hold the replacement PVDM with the double notched edge on your left.
- Step 4** Insert the PVDM into the PVDM slot, making sure that the notches on the edge of the PVDM are inserted over the bars inside the PVDM slot, as in Figure 7.
- Step 5** Push the module towards the slot and press firmly until you hear a clicking sound and the module is firmly seated in the slot, as shown in Figure 7.

**Figure 7 Installing a PVDM**

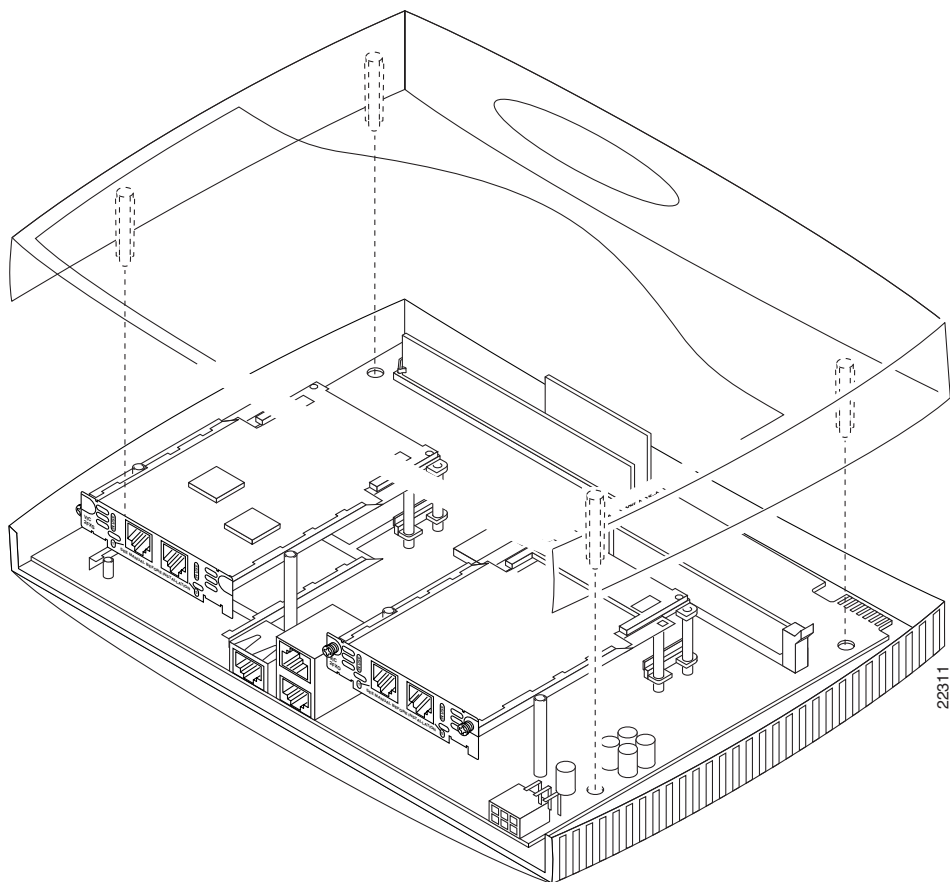


## Closing the Chassis

After installing memory or data modules on the motherboard, close the chassis by following these steps:

- 
- Step 1** If you disconnected the fan from the motherboard as described in the “Opening the Chassis” section, reconnect the fan cable to the connector labeled FAN on the motherboard.
  - Step 2** Locate the posts that protrude from the inside of the chassis cover and the corresponding openings on the chassis bottom.
  - Step 3** Line up the posts with the corresponding openings, as shown in Figure 8, and carefully slide the posts into the openings. Be careful not to damage the router motherboard with the posts.
  - Step 4** Replace the screws that you removed when opening the chassis. (See Figure 1.)

**Figure 8** Closing the Chassis





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